IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Gregory Winfield Gorman	Group Art No.: 1794
Serial No.: 10/696,373	Examiner: Alicia Ann Chevalier
Filed: 29 October 2003	Confirmation No.: 6754
For: SYMBOL-BEARING FLUID RECEPTACLE	

21 August 2009

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

In accord with 37 C.F.R. 41.37, and fully responsive to the Advisory Action of April 8, 2009 and the previous final Office Action of January 22, 2009, Appellant hereby files his appeal brief in support of his Appeal in the above-identified Application. A Notice of Appeal was filed on April 21, 2009, along with the associated fees. This Appeal Brief is filed along with a Petition for Extension of Time for two months, and the required fees for both the Appeal Brief and the Petition. The period for submission of this Appeal Brief is therefore extended up to, and includes, August 21, 2009.

Other than the brief and extension fees, no additional fees are believed due in connection with the filing of this Paper. However, should any additional fees be required in connection with this Appeal, or to render this submission both timely and complete, authorization to charge such fees to Deposit Account 12-0600 is submitted herewith, as required by 37 C.F.R. 41.20(b)(2).

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REAL PARTY IN INTEREST

The real party in interest is Gregory Winfield Gorman, the sole inventor of this '943 Application, residing at 473 Wyoming Circle, Golden, Colorado, 80403, U.S.A.

RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are currently known to Appellants that will directly affect, be directly affected by, or have a bearing on the decision to be rendered by the Board of Patent Appeals and Interferences in the present appeal.

STATUS OF CLAIMS

Claims 1-3, 5-6, 8, 21-22, and 25-32 are pending in this application, with claims 1 and 25 being independent. Claims 2-6 are original (without claim amendment during prosecution). Claims 4, 7, 9-20, and 23-24 were previously cancelled. Claims 1, 8, 21-22, and 25-26 were amended during prosecution (with claims 25 and 26 added October 6, 2005, and subsequently amended). Claims 27-32 were added October 6, 2005, and have not been amended during prosecution.

Claims 1, 5, and 25 stand rejected under 35 U.S.C. 102 as being anticipated by U.S. Patent No. 5,323,652 ("Parker"). Claims 1-3, and 5-6 also stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 7,048,971 ("Arora"). Claims 8, 21-22, and 25-32 stand rejected under U.S.C. 103(a) as being unpatentable over Arora in view of U.S. Patent No. 4,032,687 ("Hornsby, Jr.") and Parker.

The rejections of claims 1-3, 5-6, 8, 21-22, and 25-32 are being appealed herein.

STATUS OF AMENDMENTS

The present Application was filed on October 29, 2003, with claims 1-20. A first Office Action was mailed September 8, 2005, restricting the claims and requiring election of one claim group. A Response to the restriction requirement was filed and entered October 6, 2005, electing claims 1-9, adding new claims 21-32, and cancelling claims 10-20. A second Office Action was mailed January 3, 2006, again restricting the claims and requiring election of one of two species groups, along with identification of all claims readable on the elected species. A Response to the second restriction requirement was filed and entered February 3,

2006, electing a species and identifying claims 1-8, 21-22, and 25-32. Claims 9-20, and 23-24 were cancelled in the Response of February 3, 2006.

A non-final Office Action was mailed April 18, 2006, to which a Response was filed and entered July 18, 2006, including amendments to claims 1 and 25 and cancelling claims 4 and 7.

A final Office Action was mailed December 4, 2006, to which a Response was filed and entered February 5, 2007. The Response of February 5, 2007 included clarifying amendments to claims 1 and 25-26. An Advisory Action was mailed February 27, 2007, stating that the amendments would not be entered.

A Request for Continuing Examination was filed and entered on March 2, 2007, citing the response of February 5, 2007 as the required RCE submission. A non-final Office Action was mailed on May 16, 2007, to which a Response was filed and entered on August 15, 2007, including amendments to claims 1 and 25-26. A non-final Office Action was mailed on November 28, 2007, to which a Response was filed and entered on February 28, 2008, without amendments. A non-final Office Action was mailed on June 26, 2008, to which a Response was filed and entered on September 26, 2008, without amendments.

A final Office Action was mailed on January 22, 2009, to which a Response was filed and entered on March 23, 2009, without amendments. An Advisory Action was mailed on April 8, 2009. A Notice of Appeal was filed on April 21, 2009.

The Notice of Appeal filed April 21, 2009 and this Appeal Brief are responsive to the final Office Action of January 22, 2009 and the Advisory Action of April 8, 2009. Claims 1-3, 5-6, 8, 21-22, and 25-32 are currently pending, of which claims 2-6 are original (without claim amendment during prosecution).

SUMMARY OF CLAIMED SUBJECT MATTER

A. Independent Claim 1 and Dependent Claims 2-3, 5-6, 8, and 21-22

Claim 1 (and its dependent claims 2-3, 5-6, 8, and 21-22) relates to a symbol bearing receptacle for a fluid (e.g., receptacle 200, FIGS. 3-4a; mug body 301, FIGS. 5-6; and tank 401, FIGS. 7-8). The receptacle includes a container for said fluid. See, e.g., Specification p. 3, lines 6-12; p. 4, lines 24-29; p. 6, lines 27-31; and p. 7, line 31-p. 8. A transparent symbol (e.g., symbol body 101, FIGS. 1-4a; symbols 415, FIGS. 7-8; symbol "X", FIG. 5) is disposed on the container. The symbol has a water reactivity that differs from water reactivity of the container. See Specification p. 5, lines 8-18; p. 6, lines 3-14; p. 7, lines 9-12 and 23-30; p. 8, lines 6-21. The difference in water reactivities renders the symbol visually distinct from the container when the container holds the fluid and when a temperature of the container is reduced to a condensation point. See Specification p. 5, lines 8-18; p. 6, lines 3-14; p. 7, lines 9-12 and 23-30; p. 8, lines 6-21; see also Specification p. 3, lines 9-18.

Claims 2-3, 5-6, 8, and 21-22 additionally relate to a hydrophilic symbol and a hydrophobic container. According to claim 2, the symbol is hydrophilic and the container is hydrophobic, and according to claim 3, the symbol is hydrophobic and the container is hydrophilic. See, e.g., Specification p. 5, lines 7-18; p. 6, lines 9-12; and p. 8, lines 6-11 and 22-26. According to claim 5, the symbol comprises a plastic film. See, e.g., Specification p. 4, lines 13-15. According to claim 6, the symbol is a silicone film. See Specification p. 6, lines 15-16. According to claim 8, the symbol may be embedded in a surface of the container. See Specification p. 4, line 32-p. 5, line 2. According to claim 21, the container includes a confined passageway (e.g., U-tube 408, FIGS. 7-8) disposed within a surface of the container. According to claim 22, the passageway is configured for holding a coolant. See Specification p. 7, lines 1-4 and 23-30.

Features of claims 1-3, 5-6, 8 and 21-22 may be further understood in the embodiments described throughout pages 4-8 of the Specification.

B. Independent Claim 25 and Dependent Claims 26-32

Claims 25 (and its dependent claims 26-32) relates to a symbol-bearing receptacle for a fluid. The receptacle (e.g., beverage mug body 301, FIGS. 5-6) includes a container for said fluid, the container comprising an open fluid receptacle formed of a base (e.g., base 303, FIGS. 5-6) disposed upon a substrate and a wall (e.g., cylindrical wall 302, FIGS. 5-6) affixed to and extending upwardly from said base. A transparent symbol (e.g., symbol "X" formed by mug extensions 307-315, FIGS. 5-6) is disposed on the base and facing the substrate, the symbol having a water reactivity that differs from a water reactivity of said container. See Specification p. 8, lines 6-11 and 22- 29. The difference in water reactivities renders said symbol visually distinct from said container when said container holds said fluid and when a temperature of said container is reduced to a condensation point. See Specification p. 8, lines 12-21.

According to claim 26, a pattern develops on a surface supporting said base (e.g., base 203) due to water condensation when said container holds said fluid and said temperature is reduced to said condensation point. See Specification p. 3, lines 19-25. According to claim 27, the base includes a material surrounding the symbol that is dissimilar to material forming the symbol. See Specification p. 3, lines 22-23. According to claim 28, the material forming the symbol is hydrophilic and the material surrounding said symbol is hydrophobic. See Specification p. 5, lines 7-18. According to claim 29, the material forming said symbol is hydrophobic and the material surrounding said symbol is hydrophilic. See Specification p. 5, lines 7-18, p. 6, lines 9-12 and p. 8, lines 6-11 and 22-26. According to claim 30, a plurality of base extensions (e.g., mug extensions 307-325, FIGS. 5-6) elevate the substrate from the base, wherein one or more of said base extensions form the symbol (e.g., symbol "X" formed by base extensions 316-325, FIGS. 5-6). See Specification p. 7, line 31-p. 8, line 21. According to claim 31, the container includes a confined passageway (e.g., U-tube 408, FIGS. 7-8) disposed within one or both of the base and the wall. According to claim 32, the confined passageway is configured for holding coolant. See Specification p. 7, lines 1-4 and 23-30.

Features of claims 25-32 may be further understood in the embodiments described in at pages 3-8 of the Specification.

GROUNDS FOR REJECTION TO BE REVIEWED ON APPEAL

I. The rejection of claims 1, 5, and 25 under 35 U.S.C. 102(e), based on Parker.

II. The rejection of claims 1-3 and 5-6 under U.S.C. 102(e), based on Arora.

III. The rejection of claims 8, 21, 22 and 25-32 under 35 U.S.C. 103(a), based on Arora, Hornsby, Jr., and Parker.

ARGUMENT

I. THE REJECTION OF CLAIMS 1, 5, AND 25 UNDER 35 U.S.C. 102(e), BASED UPON PARKER SHOULD BE REVERSED.

A. The Prosecution History of this Case Shows that Applicant's Meritorious Arguments are Unchallenged on the Record.

Claims 1, 5, and 25 again stand rejected under 35 U.S.C. 102(b), as being anticipated by Parker. Before addressing the specific rejections, Applicant notes the following, in order to summarize recent prosecution history:

Independent claims 1 and 25 include the following features:

(a) a transparent symbol disposed on a container (e.g., a container base, in claim 25), the symbol having a water reactivity that differs from water reactivity of the container;

(b) wherein the difference in water reactivities renders said symbol visually distinct from said container when said container holds said fluid.

The outstanding rejection still asserts, without any evidentiary support, that features (a) and (b) are inherent in Parker, but Applicant's repeated demonstrations that such features are not inherent to the reference remains entirely unchallenged on the record.

Similarly, the assertion in the rejection that features (a) and (b) can be found by Official Notice is equally improper, when no evidentiary support has ever been submitted on the record. Applicant's meritorious arguments that Official Notice has been improperly asserted are also entirely unchallenged on the record.

Instead, the record clearly establishes that the Examiner has erroneously attempted to shift the burden of proof back to Applicant, that is, to establish the *non-inherency* of the features at issue. Respectfully, as clearly indicated in Section 2183 of the MPEP, this burden may not be shifted until the Examiner first presents *some* evidence (beyond a conclusory statement of opinion) that the features must, in fact, be present within the scope of the cited art, and not just mere "probabilities and possibilities." In the present case, however, this burden has not been met.

Section 2183 indicates where it is permissible for the Examiner to request from Applicant proof that "subject matter shown in the prior art does not possess characteristics relied upon in Applicant's claims ... where the Patent Office has *reason to believe* that a functional limitation ... may be an inherent characteristic of the prior art." (Emphasis added). In the present case, however, no showing has been submitted on the record that the Examiner has any objective reason to believe – the prerequisite to a request under Section 2183 – that the claimed differing water reactivities are inherent in Parker. As with any assertion of inherency, extrinsic evidence is required to "make clear that the missing descriptive matter is necessarily present in the thing described in the reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). The record clearly demonstrates that the only support for the assertion of inherency is the Examiner's own personal, conclusory opinion, which may not be considered as evidentiary proof. *See In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002).

In fact, this Board should make note that conclusory opinion of the Examiner asserted in this case does not even have anything to do with the actual language of the claim against which it was asserted. Specifically, the Examiner has asserted that differing water reactivities are inherent to Parker, but only based on the fact that Parker teaches materials have differing *thermochromicity*. In other words, the Examiner has assumed – without any evidentiary support – that materials having different thermochromicities must also have differing water reactivity. This erroneous assumption underlies the entire rejection based on Parker.

As repeatedly pointed out on the record by Applicant though, and never challenged, is the fact that thermochromicity and water reactivity are two entirely different phenomena, and do not necessarily bear any relation to one another. Thermochromicity is a color reaction to *temperature change*, whereas water reactivity is a reaction to the presence of water. The Examiner's personal opinion that these two unrelated phenomena must be related does not constitute a sufficient "reason to believe" within the clear meaning of Section 2183. As with legal determinations such as obviousness, although the Examiner is presumed to have knowledge and skill in the particular field of art, the Examiner's own knowledge and skill may not serve as the basis for finding claims unpatentable. *See Lee*. Conclusory statements are not evidence. *See KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007).

Because the above arguments have never been challenged on the record, they were all repeated to the Examiner in Applicant's last filed Response of March 23, 2009. However, the Examiner's only answer to these meritorious arguments was that "[i]t remains the Examiner's position that the claims are unpatentable for reasons previously of record in the final office action." Advisory Action of April 8, 2009, page 2. Respectfully, no objective reasons have ever been given to justify the rejection based on Parker. Accordingly, for at least these reasons, the entire anticipation rejection based solely on Parker is deficient on its face, and this Board should so reverse it.

B. A *Prima Facie* Case of Anticipation Has Not Been Established.

Turning now to the rejection of independent claims 1 and 25, the Examiner indicates that Applicant's previous arguments have been carefully considered, and acknowledges Applicant's arguments that different materials do not necessarily have different water reactivities, that no evidence has been submitted on the record to support the assertion of Official Notice to the contrary, and that it is well-known that "thermochromic" relates to color changeability with heat, and not to reaction with water. See final Office Action of January 22, 2009, pages 4-6, under "Answers to Applicant's Arguments." Not one of these arguments has been challenged, as discussed above. Yet, the Examiner maintains the position that Parker discloses all of the features of claims 1 and 25, which the reference clearly does not.

Applicant has, on several occasions, noted that the Examiner is required to provide objective evidence on the record to support the assertion that different materials automatically have different water reactivities. See, e.g., the response of September 26, 2008, at pages 3-4, and the response of March 23, 2009, at pages 4-5. No such evidence, however, has ever been submitted. The rejection further states that the separate limitation – "the symbol having a water reactivity that differs from water reactivity of the container" – is deemed to be taught by Parker, since Parker uses a thermochromic and a non-thermochromic material. See final Office Action of January 22, 2009, pages 4-6. The rejection is thus deficient on its face for at least the following reasons.

1. Section 2183 of the MPEP does not apply to the rejected claims.

In addition to the fact, discussed above, that the burden of proof under Section 2183 has not shifted to Applicant in the present case, Applicant submits to this Board that Section 2183 would not even apply to the present claims in the first place. Section 2183 pertains to functional means- (or step-) plus-function claims, product-by-process claims, and other functional language claim types. Claims 1 and 25 though, do not feature such language. For example, the claim limitation "the symbol having a water reactivity that differs from water reactivity of the container" is not a functional limitation, nor has the Examiner even asserted that it is. As the Examiner herself notes, a functional limitation attempts to define something by what it does, *rather than by what it is*. Applicant submits to this Board that water reactivity is a property of a substance, and not a function of an apparatus, that is, more of the "what it is," than the "what it does."

Since feature (a) itself is not a functional limitation (see Final Action pages 5-6), there exists no reasonable basis for rejecting this feature of the claims based on Section 2183. Applicant further points out that Official Notice appears to have been withdrawn against the claims (it is no longer listed as a reason for rejection in the final Office Action). And, as discussed above, Applicant's meritorious arguments that differing water reactivities are not inherent in Parker remains unchallenged on the record. The attempt, therefore, to tie this feature of the claims into an issue based on "functional limitations" of a different claim feature (feature (b), above), is non-responsive at best. Therefore, there is no standing assertion that Parker discloses (or suggests) a symbol and container having differing water reactivities. Accordingly the rejection fails to actually assert that all features of claims 1 and 25 are taught by Parker, and thus the Section 102 rejection is deficient on its face for at least these reasons as well. Accordingly, the Board should withdraw the rejection of claims 1 and 25 (as well as dependent claim 5) based upon Parker.

2. Parker does not support the rejection.

Furthermore, the Examiner's separate argument, namely, that Parker teaches a thermochromic symbol and a non-thermochromic container, is not supported by Parker. Parker only discusses a thermochromic *level indicator* on a propane tank. Parker never

discusses thermochromicity of the propane tank itself. The Examiner has merely assumed, without any evidentiary support, that Parker's tank is non-thermochromic. Parker, however, expressly describes that the tank may be metallic, e.g., ferrous, and it is well known in this field of art that a metal heated sufficiently will change its color with an increase in temperature (e.g., red or white when heated, and often black when cooled). Parker's metallic tank would thus have to be thermochromic, by definition. The Examiner's assumptions to the contrary are therefore without any merit. A broadest reasonable interpretation of Parker could only conclude that Parker specifically discloses a thermochromic "symbol" on a thermochromic tank.

Thus, the asserted "sound basis," for the assumption that differing water reactivities are inherent in Parker, is equally without merit. This assumption was entirely based upon the other, now disproven, assumption that Parker's tank and "symbol" are made of different materials, "e.g., thermochromic material versus non-thermochromic material." However, as demonstrated above, both of Parker's tank and "symbol" would have to be thermochromic materials. And, according to the Examiner's own conclusory reasoning, these two thermochromic materials could not have differing water reactivities if they are both thermochromic. The reasoning underlying the rejection is therefore itself inherently flawed, and is yet a further reason for this Board to reverse the outstanding Section 102 rejection.

C. Extrinsic Evidence that Disproves the Rejection Has Been Ignored

Finally, even though no such showing is necessary for the reasons stated above, Applicant's response of March 23, 2009 nevertheless included evidence, per MPEP §2183, that Parker's propane tank and "symbol" do not have differing water reactivities, irrespective of the relative thermochromicity. The evidence, now included in the attached Evidence Appendix, was presented in Appendix A to the response filed March 23, 2009. However, the Examiner has not provided any comment on the evidence, or even any indication that the evidence has been considered. The evidence and the following associated arguments are therefore reiterated herein, for consideration by this Board.

1. The unchallenged evidence of record proves that both of Parker's tank and symbol would be hydrophobic.

Parker's level indicator is indisputably intended for application on a propane tank. In order to prevent corrosion, it is known that propane tanks are typically treated with a *hydrophobic* coating, e.g., mastic. See Appendix A to the Response filed March 23, 2009, also included in the attached Evidence Appendix. Furthermore, Parker's level indicator includes a transparent top film 16, and Parker states that this film may be polyester, which is, in fact, the only example of material provided by Parker for film 16:

> "The level indicator 10 preferably includes an elongate transparent film 16, such as a **polyester film**, upon which a number of layers 18, 20 of thermochromic materials are applied. A passive opaque backing layer 22 of a certain color or white is applied to the thermochromic layer 20 remote from the transparent film 16...Consequently, the line of sight of the viewer 23 would be through the transparent film 16 through the thermochromic layers 18 and 20, when in a transparent state, to the passive opaque backing layer 22." Parker col. 3, lines 10-23, emphasis added.

"[P]olyester fiber is *extremely hydrophobic*." Smith, et al., Appendix A, Evidence Appendix, emphasis added. The unchallenged evidence of record thus demonstrates that Parker applies a hydrophobic level indicator to a hydrophobic container. In other words, the water reactivity of Parker's level indicator and Parker's container are the same. Thus, even though no such rebuttal evidence was necessary, the assertion that differing water reactivities is an inherent characteristic of Parker has been thoroughly rebutted. This Board will note though, that neither the last final Office Action nor the Advisory Action attempt to discuss the substance of the submitted evidence. Accordingly, for at least these additional reasons, this Board should find that even a proper *prima facie* case of anticipation has been sufficiently rebutted in the present case, and warrants complete reversal, which is respectfully requested.

2. The unchallenged evidence of record proves that Parker could not disclose open fluid container that is reactive with water.

Moreover, and particularly with respect to claim 25, Applicant has repeatedly argued that Parker does not teach an open fluid receptacle. Parker teaches only a propane container, which is, by definition, a closed container (otherwise, the liquid propane inside reverts to

gaseous form and escapes). Applicant also repeatedly argued how it would be known to one of ordinary skill that it would be highly undesirable to store propane – a flammable gas – in an open container, because open propane would create an explosion hazard within a storage facility or building. Finally, Applicant has noted on the record that, even if liquid propane *could be* stored in an open container, it could only be so stored if kept at a temperature so low as to render condensation on a water-reactive symbol impossible. In other words, the temperature at which propane would become liquid is significantly lower than the temperature at which water vapour condenses into liquid form. Therefore, Parker propane tank could only be an "open" container for a fluid at temperatures that could not function with the condensation point features of the claims.

The only answer to these meritorious arguments has been the assertion that Parker's propane tank has to be opened to release the propane "and is thus an open fluid receptacle in use." Final Office Action of January 22, 2009, page 7, fourth paragraph. Respectfully, this argument is meritless, because such an interpretation would not be an "open container" within the plain meaning of the phrase. Even when in use, a propane container cannot be "open" in the manner asserted, or as Applicant's open fluid receptacle. Propane tanks are not open in the manner of a glass or bottle, for example. When in use, propane tanks typically feed into tubing or gas lines that lead to an appliance or device that burns the propane, which, as easily understood by a person of ordinary skill, is still a *closed* system (and very different too, for example, from a mug). See Specification paragraphs [0043]-[0046] (page 7, line 31-page 8, line 29). Any such "opening," as asserted by the Examiner, will automatically cause the propane to escape *as a gas*, and not as a fluid. Furthermore, as also unchallenged on the record, Parker teaches against an open fluid receptacle by citing desirability of measuring volume/level of a material in a tank *without opening the tank.* See Parker col. 1, lines 13-15.

These meritorious arguments were also presented in the Response filed March 23, 2009. However, no response was provided except for the statement that "[i]t remains the Examiner's position that the claims are unpatentable for reasons previously of record in the final office action." Advisory Action of April 8, 2009, page 2. The substance of this additional evidence thus also remaining unchallenged on the record, Applicant respectfully submits that this Board must reverse the rejection for at least these additional reasons.

II. THE REJECTION OF CLAIMS 1-3 AND 5-6 UNDER U.S.C. 102(e), BASED UPON ARORA SHOULD BE REVERSED BECAUSE A *PRIMA FACIE* CASE OF ANTICIPATION HAS NOT BEEN ESTABLISHED.

Claims 1-3 and 5-6 stand rejected under 35 U.S.C. 102(b), as being anticipated by U.S. Patent No. 7,048,971 (hereinafter, "Arora"). Applicant respectfully traverses this rejection as well, and submits that this Board should reverse the rejection. Arora fails to teach (or suggest) that a difference in water reactivities between the symbol and the container renders the symbol visually distinct, and when the container holds a fluid.

Arora discloses a two-part symbol 10, with one part being hydrophilic, and the other being hydrophobic. (See Arora, FIGS. 1-2). The two-part symbol 10 can be attached to a substrate, which can be, in one example, an LCD (see col. 12, lines 39-57). Arora, however, never discusses any relationship between *water reactivities of the symbol and the LCD.* In fact, Arora clearly teaches that it is only the difference between water reactivities of the *parts of the symbol itself* that renders the symbol visible, and not a difference with the container. Applicant has acknowledged that an LCD screen will contain fluid typically, but the presence of the fluid in the LCD will have no effect on the visibility of Arora's symbol.

In response to the above argument, the Examiner has noted that Arora's disclosure states that "stimuli also includes a change in temperature including condensation of water vapor from air on the hydrophilic coating" Col. 4, lines 23-26, cited in the final Office Action of January 22, 2009 at page 7, final paragraph. Respectfully, regardless of the merits of this assertion, the assertion has nothing to do with a difference in water reactivities between the symbol and the LCD (which the Examiner likens to a container). Arora simply does not teach differing water reactivities (symbol vs. container) that render a symbol visually distinct when the container holds a fluid.

In contrast, independent claim 1 of the present Application, as last amended, features that the difference in water reactivities between the symbol and the container is what renders the symbol visually distinct, and when the container holds the fluid. Arora does not teach or suggest such limitations. The visibility of Arora's symbol is self-contained by its two-part structure and, by definition, will not change whether it is attached to a container or not. In

other words, the water reactivity *of the LCD* will have no effect on the visibility of the symbol, nor will the presence of the liquid crystal that may be contained within the LCD device have any so effect. It is important to note that Arora never actually shows a container in a single drawing. It must further be noted that an LCD without fluid is, by definition, an unworkable device. There could be no purpose for placing an indicator on an LCD to show whether the LCD contained fluid. Accordingly, Arora cannot teach (or suggest) that its symbol's visibility is dependent on either (a) the water reactivity relationship with the container, or (b) the fluid being present in the container, both of which are clearly featured in independent claim 1 of the present Application.

Claims 2-3 and 5-6 all depend from independent claim 1, and therefore contain all of the features of the base claim, plus additional features. Accordingly, the rejection of these dependent claims is respectfully traversed for at least the reasons discussed above in traversing the rejection of independent claim 1 based solely upon Arora. Applicant respectfully requests reversal of the Section 102 rejection of claims 1-3 and 5-6, based on Arora.

III. THE REJECTION OF CLAIMS 8, 21-22, AND 25-32 UNDER 35 U.S.C. 103(a), BASED UPON ARORA IN VIEW OF HORNSBY, JR. AND PARKER, SHOULD BE REVERSED.

Claims 8, 21-22, and 25-32 stand rejected under 35 U.S.C. 103(a), as being unpatentable over Arora in view of Hornsby and Parker. Applicant respectfully traverses this obviousness rejection for at least the reasons of record, those discussed above, and as follows.

The rejection should first be reversed for at least the reasons discussed above with respect to the rejections of claims 1 and 25 based on Parker or Arora taken alone. The clear deficiencies in the rejections above have not been resolved by the proposed combination of the two references together, nor by the addition of Hornsby Jr. As discussed above, Arora fails to teach any interaction between water reactivities of the symbol and its container, and neither Hornsby nor Parker even teach or suggest anything about water reactivities. Accordingly neither Hornsby nor Parker could modify Arora to make up for this significant deficiency in the base references.

A. No Teaching or Suggestion, or Other Evidence, Has Been Cited to Support the Proposed Combination of References

Claim 25 in particular additionally features that the container is open. As discussed above, Parker does not show an open container. The reference has been clearly misread in this regard. Parker teaches a propane container, which is a closed container (otherwise, the liquid propane inside reverts to gaseous form). It would be highly undesirable to store a flammable gas in an open container as it could create an explosion hazard within a storage facility or building. Additionally, propane stored as a liquid in an open container must either quickly revert to its gaseous form (hence, no storage), or else it must be kept at a temperature so low as to render condensation on a water-reactive symbol impossible. No citation has been provided for how the addition of Hornsby and/or Arora to Parker can resolve this problem. In fact, no explanation has been given for even how the disparate references can be combined as proposed.

Hornsby shows an open cup 12, but the rejection fails to even assert that Hornsby's cup 12 could somehow be adapted to the LCD, for example, as cited from Arora. The reference does not even assert that there is any teaching or suggestion in either reference that one of ordinary skill would be motivated to do so. One of ordinary skill would not consider a drinking cup to be useful to hold either the propane gas from Parker, or the liquid crystal from Arora. The references are clearly nonanalogous.

Furthermore, as easily understood in the art, an LCD device cannot operate as an open container, without ruining the "container" for its intended use. A proposed combination cannot be considered obvious when one or more of the references would be rendered unusable as intended. Accordingly, with respect to all of claims 25-32, the LCD example from Arora cannot justify the holding of obviousness.

Additionally, it must further be noted that Hornsby's appliqué 10, similar to indicator from Parker, is nothing but a *temperature indicator*. As discussed in detail above, the Examiner appears to have significantly confused temperature indication (e.g., thermochromicity) with water reactivity, when the two phenomena have no necessary relationship. In fact, were the temperature indicators from either Hornsby or Parker applied to the cited LCD from Arora, nothing more than a temperature threshold would be indicated

for the LCD. The combination would not, for example, indicate the presence of the liquid crystal fluid in the LCD. No combination of the three references could indicate whether the liquid crystal was actually present in Arora, and Applicant notes for the record that no teaching or suggestion has been cited to support the existence of such a possibility.

Section 2143.01 of the MPEP requires that, absent any objective evidence on the record of some well known principle in the art, the motivation to combine the references must come from some teaching or suggestion from the references themselves. Conclusory opinions by the Examiner cannot satisfy this requirement, as emphasized in *KSR*, cited above. Because the record fails to indicate any evidence – from the references themselves, or otherwise from the art – to support the proposed combination, the outstanding obviousness rejection is further deficient on its face for at least these reasons, and this Board should therefore require its reversal.

B. None of the Cited References Teach or Suggest a Symbol Embedded in the Surface of a Container.

With respect to at least claim 8 of the Application, the rejection is further deficient on its face because none of the cited references teaches or suggests a symbol embedded in the surface of the container. There is simply no disclosure whatsoever in any of the three references that could be reasonably interpreted to teach or suggest this limitation.

The American Heritage Dictionary of the English Language (Fourth Ed. 2000), defines the term "embed" as meaning:

> (1) To fix firmly in a surrounding mass: embed a post in concrete; fossils embedded in shale. (2) To enclose snugly or firmly. (3) To cause to be an integral part of a surrounding whole.

None of Arora, Hornsby, or Parker show any symbol embedded in a container surface. As unambiguously shown in FIGS. 1-2 of Arora, FIGS. 1-5 of Hornsby, and FIGS. 1 and 5-8 of Parker, *not a single indicator/symbol is shown to be embedded in any surface of any container*. Arora and Hornsby both show nothing other than stick-on labels or films that will always be on top of – and not embedded within – the surface of the respective substrate

(Arora, not shown or numbered) or cup 12 (Hornsby). Parker additionally discloses magnetic indicators, but also only *on top of* – never embedded within – the surface of the tank 12.

The only response to this argument, which has been repeatedly submitted on the record, is the statement that "it would have been obvious ... to use Arora's symbol of [*sic.*] different types of containers, i.e. the symbol is embedded in a surface of the container, the container comprising an open fluid receptacle formed of a base disposed upon a substrate and a wall affixed to and extending upwardly from said base, container comprising a confined passageway, etc, that need easy visible references to the temperature of the container." Final Office Action of January 22, 2009, page 8, final paragraph. The rejection then merely suggests that type of container is a matter of "design choice."

Respectfully, a particular "design choice" could not be obvious when it has never been shown to exist in the art. The record is unambiguous on this point. Furthermore, the rejection cites no evidence to support the conclusory personal opinion that it would be obvious to modify Arora to include multiple features of Applicant's claims (claim 6 in particular) that are nowhere suggested in Arora, Hornsby, or Parker. As also codified in Section 2143.01, the Examiner has the additional burden to indicate on the record where the prior art itself (absent other objective evidence) teaches or suggests the motivation to *modify* the references as also proposed. In the present case, the Examiner asserts that the cited art merely *could be modified* to include the limitations of the present claims. The record fails to show, however, any objective, factual evidence supporting the asserted modifications.

Thus, the only support on the record for the proposed modifications of the cited art is the Examiner's own personal opinion, which, as discussed above, is forbidden to justify such rejections. *See Lee*; *KSR*. "Rejections on obvious grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*. Accordingly, the Board should reverse the rejection of claim 8 for at least these additional reasons.

It should additionally be noted that, in order to make Arora's symbol an *embedded* symbol, Arora's LCD device would likely be rendered unfit for use. Arora's symbol is meant to be stuck to the surface of a substrate, e.g., an LCD. Embedding Arora's symbol *in* the

LCD, on the other hand, would at least displace liquid crystal material from that area of the screen in which the symbol were embedded. More likely though, any attempt to embed such a symbol within the thin, fragile glass substrate of an LCD screen would likely fracture the screen and cause the liquid crystal inside to leak out, thereby rendering the device inoperable for these additional reasons.

C. None of the Cited References Teach or Suggest a Confined Passageway Disposed within the Surface of a Container.

With respect to at least claims 21 and 31, none of the three references show a confined passageway disposed within a surface of the container, as featured in the claim. Similar to the deficiencies in the rejection of claim 8, not one of the three references teaches or suggests any features within the surface of a container, let alone a confined passageway. There is simply no disclosure whatsoever in any of the three references that could be reasonably interpreted to teach or suggest this limitation either. Applicant continues to remain at a loss to understand what is allegedly the reliance on any of these references with respect to these claims.

Hornsby shows a cup 12, but Hornsby never shows or describes anything embedded or disposed within the surface of the cup 12. Parker shows a tank 12, but equally fails to show or describe anything – embedded or disposed – within the surface of the tank 12, and particularly not anything that could be reasonably interpreted to be a confined passageway. The Examiner has not even asserted that anything can be embedded in the thin, fragile surface of an LCD screen, such as Arora's.

Both the final Office Action and the Advisory Action yet again failed to assert what features of the references allegedly read upon these features of claim 21 and 31. The Actions instead merely asserted that these features would have been obvious, simply because Hornsby and Parker disclose different types of containers. Even if this assertion could somehow encompass the actual scope of the claims against which it is asserted, the assertion is still nothing more than the personal opinion of the Examiner. There is no evidence on record to support the assertions, and the references themselves fail to in any way teach or suggest the modifications as proposed.

By definition, the Examiner's personal opinion can never satisfy the definition of "documentary evidence, capable of objective review and rebuttal." The Examiner, for example, has not submitted anywhere in the record the rationale for how she arrived at her personal opinion, from what source she received the knowledge that formed the basis of her opinion, nor the actual dates such knowledge was obtained by her. The present case therefore presents the exact situation expressly rejected by the Federal Circuit in *Lee*, and the Supreme Court in *KSR*. The Board should also reverse the rejection for at least these reasons.

D. None of the Cited References Teach or Suggest a Passageway in the Surface of a Container Is Configured for Holding a Coolant

Similar to the rejection of claims 21 and 31, discussed above, the rejection of claims 22 and 32 is even further deficient. Claim 22 depends from claim 21, and claim 32 depends from claim 31, and therefore these claims are patentable for at least the same reasons that apply to their respective base claims. The rejection is further deficient for failing to even assert where any one of the references teaches or suggests that the alleged passageway in the surface of the container additionally is configured for holding a coolant.

Again, not one of the references shows or describes anything similar to this limitation in claims 22 and 32, and the rejection makes no effort to indicate where such features are alleged to exist in the cited art. These precise arguments have been repeatedly presented to the Examiner, but no substantive response has ever been provided. Only the broad assertion has been given that, since Hornsby and Parker disclose different types of containers, it would have been obvious to use Arora's symbol on different containers. This "response" has never even asserted that a passageway configured for holding coolant is actually shown in one or more of the references (it clearly is not). The Examiner merely provides a blanket list of Applicant's claim features (excluding the coolant-holding passageway), and ends with "etc." Presumably, this "etc." is meant to encompass the features of claim 22. However, as with the other rejections, there is absolutely no support in Hornsby, Arora, or Parker for the proposed modification to the references to include this *additional* feature that does not anywhere appear in the references themselves. No objective evidence has ever been provided to

support the proposed modification. Therefore, the Board should reverse the rejection of claims 22 and 32 for at least these reasons as well.

E. None of the Cited References Teach or Suggest a Symbol Disposed on a Base Facing a Substrate.

In addition to the other noted deficiencies, discussed above, in the rejection of claim 25, it must also be noted that the rejection of this claim is even further deficient on its face for failing to show where the cited references (or any other evidence) anywhere teach or suggest a symbol disposed on a base facing a substrate, from which extends a wall that forms the container. Neither of Hornsby and Parker could teach or suggest such limitations because both references clearly teach to affix their temperature indicator to only a *wall* of the respective container, and not any portion of the container that could reasonably be interpreted to be its base. See, e.g., Hornsby FIG. 1 and col. 2, lines 28-34; see Parker col. 1, lines 15-17. Arora would be equally deficient in this respect as well, since the "base" of an LCD screen could only be the thin glass edge that is covered by the screen's housing.

None of the three references could be modified either, to locate the respective symbol to a base of the container because, in each instance, the symbol would not be visible, and thus the proposed modification to relocate the symbol would ruined the use of such symbols for their intended purpose (i.e., the symbols could not be seen). All three references are meant to have the symbols seen, and Parker and Hornsby in particular require that the temperature be seen from the *wall side* of the container.

The rejection is therefore further deficient on its face according to Section 2143.01 of the MPEP. As discussed above, Section 2143.01 requires that, absent objective evidence on the record of some well-known principle in the art, the references themselves must provide a teaching or suggestion to make the proposed modifications and combination. In the present case, however, no evidence of any well-known art principle has been submitted to the record, nor has any teaching or suggestion from the references themselves been cited in support of the proposed combination of all three references, or the additional modifications that are required thereto. Without such evidence on the record, the proposed combination is itself, by definition, conclusory only, and thus a clear demonstration of impermissible hindsight.

Accordingly, the Section 103 rejection is further deficient on its face for at least these reasons, and reversal by this Board is again respectfully requested.

F. None of the Cited References Teach or Suggest a Plurality of Base Extensions Forming the Symbol and Elevating the Substrate from the Base.

Claim 30 also depends from claim 25, and is therefore nonobvious for at least the same reasons as the base claim. With further respect to claim 30 though, none of the references, whether taken alone or in combination, teach or suggest a plurality of base extensions elevating the substrate from the base, nor that one or more of the base extensions form the symbol. Applicant is at a loss to understand what portions of these references are allegedly meant to somehow teach or suggest such features.

In fact, not one of the three cited references shows any extension from a base, let alone an extension forming the symbol. As discussed above, the indicators from Hornsby and Parker are both attached to only a *wall* of a container, and never the base. Arora simply remains silent about any containers, with the cited "LCD" being the only object mentioned by Arora that could even be considered to be a "container," and even then, only in a considerably broad sense. No attempt has been made on the record to answer these arguments, despite the fact that they have been repeatedly raised. The rejection of claim 30 therefore, is entirely without merit, and Applicant respectfully requests its reversal as well by this Board.

G. Even a Proper Case of *Prima Facie* Obviousness Has Been Overcome on Rebuttal.

Even could some motivation have been place in evidence to support the proposed combination (which Applicant does not concede), the rejection would still have to be withdrawn on rebuttal, since no combination of the three references could achieve the unchallenged advantages of the present claims.

With respect to claim 25, for example, none of the references, alone or in combination, could indicate whether an open container actually contains fluid. Parker and Hornsby could not show anything more than a temperature of the container, irrespective of

whether or not the container contained a fluid. Arora fails to show how *any* parameter of the container, whether fluid-containing or temperature, could be indicated. Arora's purpose is merely to show the symbol itself, without any relation to the object on which the symbol is placed. The contents of an LCD, or any other "container," are irrelevant to Arora's symbol. In the only example cited, Arora's symbol would appear (or not) regardless of whether there was any fluid in the LCD device.

Accordingly, the novel, useful, and unchallenged advantages of the present claims would still overcome even the asserted *prima facie* Section 103 rejection of record, had it been properly established. For at least these additional reasons, Applicant respectfully requests reversal by this Board of the outstanding obviousness rejection.

CLAIMS APPENDIX

Appellants enclose a copy of the claims involved in this appeal as an appendix hereto, on pages C-1 to C-3.

EVIDENCE APPENDIX

Pursuant revised 37 C.F.R. 41.37, an Evidence Appendix is submitted herewith, following the Claims Appendix. The Evidence Appendix is found on pages E-1 to E-14

RELATED PROCEEDINGS APPENDIX

Appellants submit herewith a Related Proceedings Appendix following the Evidence Appendix, as required pursuant revised 37 C.F.R. 41.37. The Related Proceedings Appendix is found on page R-1.

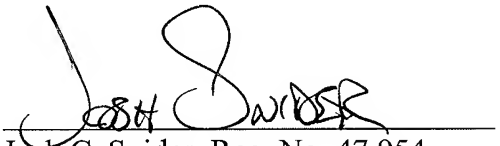
CONCLUSION

Applicant/Appellant respectfully submits that the claims 1-3, 5-6, 8, 21-22, and 25-32 are all patentable over the cited art of record, and a finding thereof is respectfully requested from this Board.

In light of the Petition for Extension of Time for two months, submitted herewith, this Appeal Brief is timely filed today, Friday, August 21, 2009. The Commissioner is hereby authorized (pursuant 37 C.F.R. 41.20(b)(2)) to charge the $270 fee for this Appeal Brief to Deposit Account No. 12-0600, or any other fees required to make this submission both timely and complete.

Respectfully submitted,

LATHROP & GAGE LLP

By: 

Josh C. Snider, Reg. No. 47,954
4845 Pearl East Circle, Suite 201
Boulder, Colorado 80301
Tel: (720) 931-3000
Fax: (720) 931-3001

CLAIMS APPENDIX TO APPEAL BRIEF

1. (Previously Presented) A symbol-bearing receptacle for a fluid, said receptacle comprising:

a container for said fluid; and

a transparent symbol disposed on said container, said symbol having a water reactivity that differs from water reactivity of said container;

wherein the difference in water reactivities renders said symbol visually distinct from said container when said container holds said fluid and when a temperature of said container is reduced to a condensation point.

2. (Original) The symbol-bearing receptacle of claim 1, wherein said symbol is hydrophilic and said container is hydrophobic.

3. (Original) The symbol-bearing receptacle of claim 1, wherein said symbol is hydrophobic and said container is hydrophilic.

4. (Cancelled)

5. (Original) The symbol-bearing receptacle of claim 1, wherein said symbol comprises a plastic film.

6. (Original) The symbol-bearing receptacle of claim 1, wherein said symbol comprises a silicone film.

7. (Cancelled)

8. (Previously Presented) The symbol-bearing receptacle of claim 1, wherein said symbol is embedded in a surface of said container.

9-20. (Cancelled)

21. (Previously Presented) The symbol-bearing receptacle of claim 1, said container comprising a confined passageway disposed within a surface of the container.

22. (Previously Presented) The symbol-bearing receptacle of claim 21, said passageway configured for holding a coolant.

23-24. (Cancelled)

25. (Previously Presented) A symbol-bearing receptacle for a fluid, said receptacle comprising:

a container for said fluid, the container comprising an open fluid receptacle formed of a base disposed upon a substrate and a wall affixed to and extending upwardly from said base; and

a transparent symbol disposed on said base and facing said substrate, said symbol having a water reactivity that differs from a water reactivity of said container;

wherein the difference in water reactivities renders said symbol visually distinct from said container when said container holds said fluid and when a temperature of said container is reduced to a condensation point.

26. (Previously Presented) The symbol-bearing receptacle of claim 25, said symbol comprising a pattern that develops on a surface supporting said base due to water condensation when said container holds said fluid and said temperature is reduced to said condensation point.

27. (Previously Presented) The symbol-bearing receptacle of claim 25, said base comprising a material surrounding said symbol that is dissimilar to material forming said symbol.

28. (Previously Presented) The symbol-bearing receptacle of claim 27, wherein said material forming said symbol is hydrophilic and said material surrounding said symbol is hydrophobic.

29. (Previously Presented) The symbol-bearing receptacle of claim 27, wherein said material forming said symbol is hydrophobic and said material surrounding said symbol is hydrophilic.

30. (Previously Presented) The symbol-bearing receptacle of claim 25, further comprising a plurality of base extensions elevating said substrate from said base, wherein one or more of said base extensions form said symbol.

31. (Previously Presented) The symbol-bearing receptacle of claim 25, said container further comprising a confined passageway disposed within one or both of said base and said wall.

32. (Previously Presented) The symbol-bearing receptacle of claim 31, said confined passageway configured for holding a coolant.

EVIDENCE APPENDIX TO APPEAL BRIEF

This Evidence Appendix includes a copy of Appendix A to the Response filed January 22, 2009. The Evidence contained herein was entered in the record with the Response of January 22, 2009, and is viewable in PAIR.

APPENDIX A

To the Response to final Office Action of 01/22/2009

Application Serial No. 10/696,373

PROPANE
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- Environmental Benefits
- Virtual Home Tour
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Discover every spot where propane can make a difference with our interactive home tool.

Find a Propane Retailer
Are you a current Propane customer?

◯ Yes (other than grill)

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Enter your ZIP Code to find a propane retailer near you.

ZIP GO

Don't know the ZIP Code? **Click here** to use the USPS ZIP Code lookup.

Tanks ---- Select Product ---- GO

UNDERGROUND TANKS

You already know the benefits of gas energy.

It's clean, safe, economical, and reliable. It can fuel the furnace, water heater, cook-top, clothes dryer, and many other appliances in the home. With tank burial and landscaping designs able to keep propane tanks out of sight, more and more homeowners across the nation are turning to propane to bring the warmth of gas energy to their homes.

Out of Sight, Out of Mind

Propane can fuel a home discreetly, almost invisibly, from underground tanks. Once a propane tank is buried, only a small dome is visible – mere inches above the ground. The dome houses valves, gauges, and regulators, allowing for easy servicing and refilling. Even large-capacity tanks can be installed with minimal visual intrusion, yet still providing the clean, efficient comfort of propane energy.

The Tank

Propane tanks are constructed of heavy steel and are specially painted with a mastic coating to prevent corrosion. Environmentally friendly and requiring no maintenance, a propane tank will typically last for 30 to 40 years. Single-family homes can be fueled by tanks of varying sizes, depending on the demand. Smaller 100-gallon tanks provide energy for appliances, while 1,000+ gallon tanks can fuel very large homes with swimming pools and hot tubs. Generally, 500-gallon tanks easily accommodate an average four-bedroom home.

Excavation

Excavation is usually small – approximately four feet wide by twelve feet long by five feet deep. Because of the smaller dimensions, excavation costs are minimal.

Your Propane Retailer Can Help

Propane retailers are professional gas installation specialists. They can work with you on a project – from start to finish – to ensure the best possible energy system for your home. Generally, they will install the tank and make all gas hook-ups to the house. Your local propane retailer can assist you with:

- Site advice
- Tank sizing
- Full installation support

Learn more about "Underground Propane Tanks"

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Monday March 23rd 2009

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PROPANE TANK

You already know the benefits of propane. It's clean, safe, economical, and reliable. It can fuel the furnace, water heater, cook-top, clothes dryer, and many other appliances in the home. With a buried tank and landscaping designs able to keep propane tanks out of sight, more and more homeowners across the nation are turning to propane to bring the warmth of gas energy to their homes.

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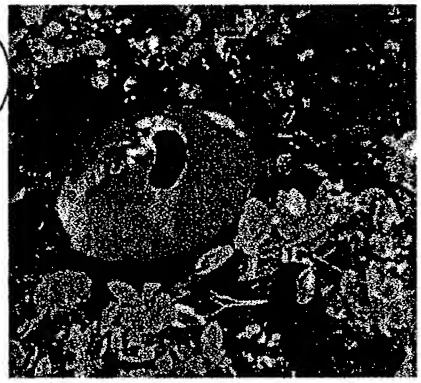


Excavation

Excavation is usually small – approximately four feet wide by 12 feet long by five feet deep. Because of the smaller dimensions, excavation costs are minimal.

Paraco Gas has professional gas installation specialists. We can work with you on a project – from start to

ELASTUFF 120 MASTIC

100% SOLIDS POLYURETHANE MASTIC
Classified by Underwriters Laboratories Inc.
in Accordance with ANSI/NSF Standard 61

Technical Data & Application Instructions

PRODUCT DESCRIPTION

ELASTUFF 120 MASTIC is a two-component, 100% solids polyurethane elastomer in a high-build, mastic consistency. This system provides a limited workable pot life, and therefore does not require specialized application equipment. **ELASTUFF 120 MASTIC** can be applied by trowel or can be thinned slightly to create a brush/roller-grade version for use on vertical and horizontal applications requiring either heavy or light film builds. **ELASTUFF 120 MASTIC** is a highly crosslinked polymer coating, which yields a dense, slick finish. The non-porous nature and excellent hydrolytic stability, coupled with resistance to cathodic disbondment, make **ELASTUFF 120 MASTIC** an excellent barrier to moisture and corrosion.

Designed to protect surfaces subjected to abrasion in aqueous solutions or environments, **ELASTUFF 120 MASTIC** can be used in potable water systems, salt water, various slurry systems, and numerous acid and base solutions.

The high tensile strength of **ELASTUFF 120 MASTIC** contributes to its resistance to abrasion and tearing. This toughness, combined with its high elongation properties, results in outstanding flexibility and impact resistance.

BASIC USES

ELASTUFF 120 MASTIC is used as a sealant, caulk, filler, bonding agent and finish where hydrophobic, abrasion and chemical resistance properties are required. It is used over sealed concrete and primed metal surfaces, and also has excellent adhesion to high density polyethylene (HDPE) products when applied in conjunction with a heat treated surface. Typical applications utilizing **ELASTUFF 120 MASTIC** include interior tank lining, waste/water containment, manhole repairs, flumes, reservoirs, valves, interior pipe, and other areas subjected to aqueous environments.

ELASTUFF 120 MASTIC is a non-toxic lining and can also be used in applications associated with potable water containment. It has been tested and classified by UL in accordance with ANSI/NSF 61, Section 5, Barrier Materials. Any primers or topcoats use in potable water applications should also be certified.

TYPICAL PROPERTIES

1. **Mixing Ratio:**
   1 part A to 1 Part B by volume (1A:1B)
2. **Flash Point:**
   Part A > 200°F (93°C)
   Part B > 200°F (93°C)
3. **Dry Time to Touch:**
   4 hours tack free @ 75°F (24°C), 50% R.H.
4. **Cure Time:**
   90% after 24 hours @ 75°F (24°C), 50% R.H.
5. **Mixed Usable Pot Life:**
   20 minutes @ 75°F (24°C), 50% R.H.
6. **Water Absorption:**
   Less than 1% weight gain after 7 days [ASTM D570]
7. **Tensile Strength:**
   1,300 psi (±100) (9.0 MPa) [ASTM D412]
8. **Elongation:**
   150% (±20) [ASTM D412]
9. **Tear Strength:**
   200 lb/in. (±30) (35 kN/m) [ASTM D1004]
10. **Hardness:**
    30 to 40 Shore D @ 75°F (24°C)
    40 to 50 Shore D @ 35°F (2°C)
    [ASTM D2240]
11. **Abrasion Resistance:**
    20 to 30 mg weight loss with CS-17 wheel;
    50 to 70 mg weights loss with H-10 wheel using 1000 gm weight at 1000 revolutions [ASTM D4060]
12. **Low Temperature Flexibility:**
    Passes ¼" (6 mm) mandrel bend @ -4°F (-20°C)
13. **Low Temperature Impact Resistance:**
    Passes 160 inch pound (18.1 Joules) direct @ -4°F (-20°C)

COLORS

Standard color for **ELASTUFF 120 MASTIC** is Gray. For custom colors, consult UNITED'S Technical Service Department.

Meets All /Federal, State and Local V.O.C. Requirements

Fashion Applications for Polyester Fiber, Particularly Hydrophilic Polyester

By Florence Smith, TS&D Europe,
and Dr W.P. Mei, Associate TS&D Specialist
Dow Corning Corporation

Overview

Despite the fact that polyester fiber is extremely hydrophobic, it has a bright future, particularly in the fashion industry, as consumers increasingly are attracted by its easy-care properties. While research continues to develop an ideal hydrophilic polyester solution, this article examines ways to increase the hydrophilicity of polyester via processing routes (such as denier reduction and microfibers) and chemical routes (topical finishes).

Introduction

Polyester is a manufactured fiber in which the fiber-forming substance is any long-chain, synthetic polymer composed of at least 85% of an ester of a substituted aromatic carboxylic acid. This can include, but is not restricted to, substituted terephtalic units, p(-R-O-CO-C_6H_4CO-O-)$_x$ and parasubstituted hydroxy-benzoate units, $_p$(-R-O-CO-C_6H_4-O-)$_x$.[12]

Polyester is manufactured by reacting ethylene glycol with either terephtalic acid or its methyl ester in the presence of an antimony catalyst. The reaction is carried out in an autoclave at high temperature (ca 300°C) for five to eight hours. Then, it placed under a hard vacuum to achieve the high molecular weights required to form useful fibers. Following that, polyester is melt-spun, which involves melting the polymer chips for extrusion through the spinneret and then directly solidifying them by cooling. The filaments are drawn and stretched by about 400% in order to achieve the required characteristics.[12, 13]

History of polyester

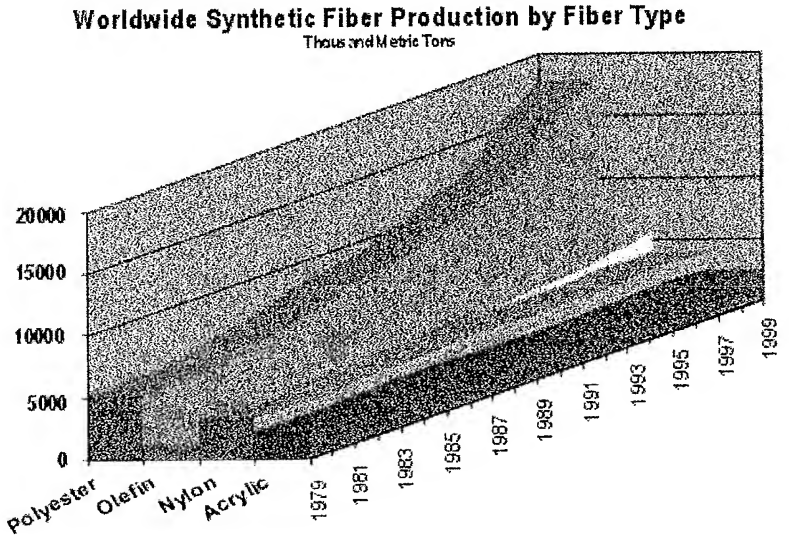
The work of Wallace Carothers in the late 1920s laid the foundation for all processes used in the production of filaments such as polyester. In the late 1940s, Calico Printers Association in Great Britain picked up on Carothers' work and they were the first to produce polyester. DuPont subsequently acquired the polyester filament production patent rights for the United States and ICI acquired the patent rights for the rest of the world.

Polyester was commercialized in the 1950s transforming the "wash and wear" novelty into a revolution in textile product performance. As polyester garments emerged from the dryer wrinkle-free, consumers increasingly bought more garments made from polyester.

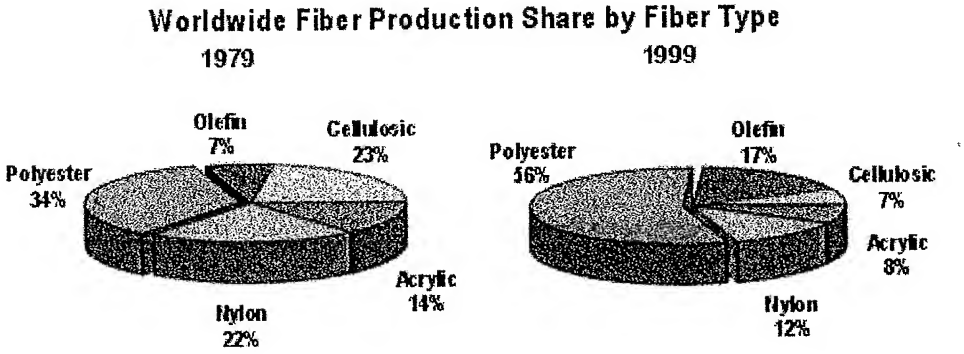
Fabrics became more durable, color became more permanent, and shape-retaining knits offered new dimensions in comfort.

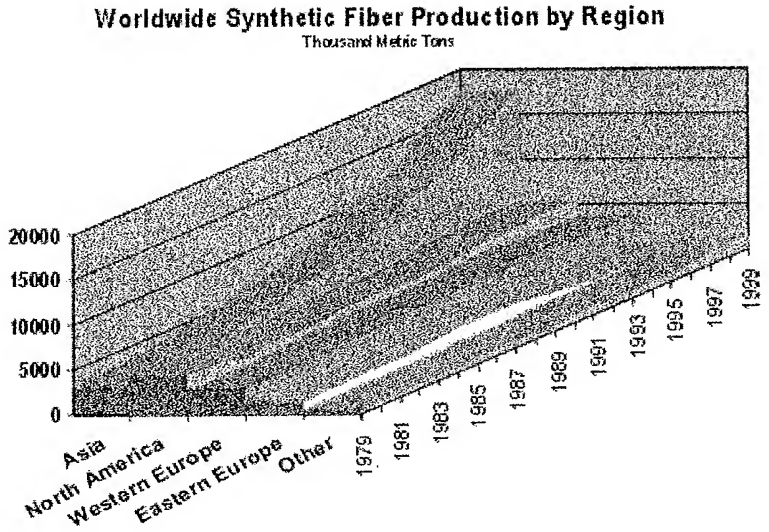
Polyester: The synthetic fiber of choice

According to recent statistics,[12] polyester is rapidly becoming the synthetic fiber of choice with a strong, long-term growth outlook In 1999, statistics show that out of 34.2 million metric tons of synthetic fibers manufactured, 17.9 million metric tons of that amount included manufactured polyester fibers.



In the global synthetic fiber production market, polyester production shares have increased from 34% in 1979 to 56% in 1999. This growth has resulted in a major shift in production from North America and Europe to Asia. In 1999, Asian production was 17.7 million metric tons compared with 5.5 million metric tons in North America and 3.9 million metric tons in Europe.





The need for hydrophilic polyester

Polyester has become very successful within the fashion industry due to its chemical resistance, its wrinkle resistance and its quick-drying properties. However, polyester only has a moisture regain of 0.4% (measured at 20°C and 65% relative humidity) when compared to cotton, which has a moisture regain of ca 7%. This low moisture regain means polyester is extremely hydrophobic. The hydrophobic nature of polyester results in a relatively low level of comfort, as moisture is not absorbed nor drawn away from the skin. This has restricted the use of polyester in such textile applications as sportswear, underwear and bedding. Additionally, due to the hydrophobic nature of polyester, the fabric will exhibit static problems such as cling during wear and difficulty in cutting and sewing.

Creating a hydrophilic polyester to meet market needs has been explored via chemical routes and processing routes. Chemical routes include using a topical finish and processing routes involve using denier reduction and microfibers. Fabric construction can also influence the hydrophilic properties due to mechanisms of moisture transport between fabrics. Moisture can remain in the fiber cross-sections, on the surface of the fibers, in the voids formed within a yarn by a plurality of fiber channels and in the voids caused by yarn crossovers in woven and knitted fabrics. While vapor transfer depends on air permeability independent of fiber type, capillary wicking of liquid water exhibits a high dependency on the hydrophilic degree of the fibers. A minimum moisture regain of 4% is required to activate the wicking mechanism.[4]

While the high-tech outdoor apparel market is eager to obtain and pay for fiber innovation, the more traditional textile industry is reluctant to add cost to an already

competitive market. Most textile applications will not require durable hydrophilic properties, as initial "off the shelf" performance is more important. However, sportswear applications require a five-wash minimum durability. This wash durability requirement will also influence the cost structure. However, it should be noted that due to poor rinsing, successive launderings will leave some residual rewetting surfactants or will erode the surface of the polyester.

Processing route: Denier reduction and microfiber

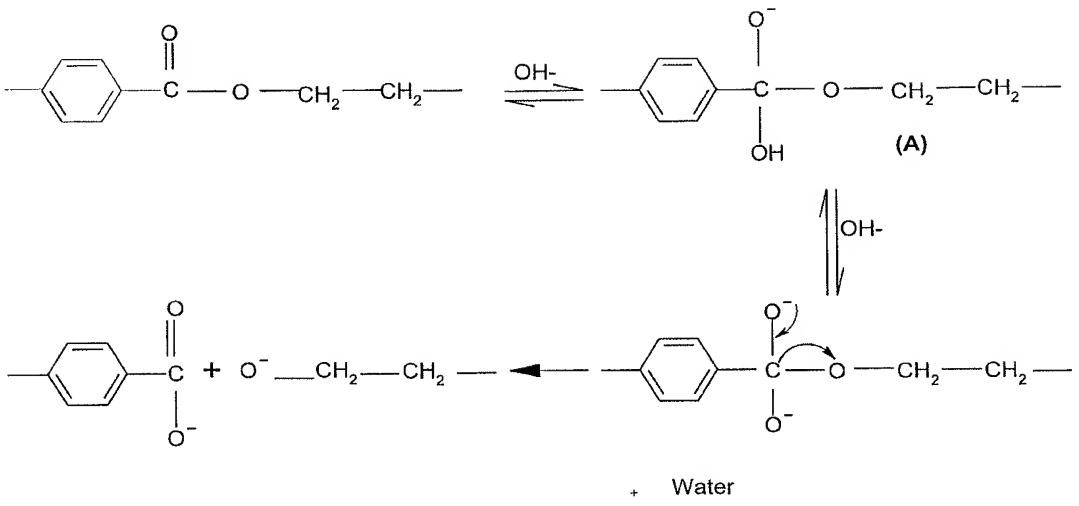
There are ways to increase the hydrophilicity of polyester via processing routes such as denier reduction and microfibers.

Conventional fibers are in the range of 1.5 to 4 deniers per filament (dpf). (For example, cotton contains 1.5 dpf; polyester, contains 2 dpf.) Microfibers are in the range of 0.5 dpf (minimum below 1 dpf) and are manufactured like standard fibers, via extrusion. Microfibers contain up to four times as many filaments as conventional fibers and therefore have more surface area.[8] To illustrate, a woven cloth with a 1 dpf per warp and 0.55 dpf per weft, will have an absorbency of 8 seconds. This considerably improves the hydrophilicity compared with standard fibers and the hand of microfibers is similar to the hand of silk.

Denier reduction is actually an alkalization of the polyester and a surface phenomenon by which shorter chains from the fiber surface are hydrolyzed.[2] It is suggested the number of hydrophilic groups on the fiber surface is increased due to the chain scission. [5]

Denier reduction involves weight loss that varies depending on the initial thickness of the fabric and the bath conditions. Denier reduction of 5% to 15% usually is required in order to achieve noticeable hydrophilicity.

The polyester alkalization mechanism is as follows:[2]



The chemistry, based on the nucleophilic attack of a base on the electron-deficient carbonyl carbon along the polymer chain, causes scissions at the ester linkages and produces carboxyl and hydroxyl polar groups. The increased surface polarity enables polar interaction of hydrogen bonding with water molecules, thus increasing the water wettability of the fibers.

It is the removal of water that drives the reaction to completion. The intermediate anion (A) is negatively charged and due to the electrostatic repulsion, between the negative fixed ions on the polyester and the mobile hydroxyl ions, the further attack by the base will be retarded

The reaction can be processed using three mechanisms: 1) in a solvent at room temperature; 2) in water at high temperature; and 3) in water at high temperature with a cationic catalyst.

When processing via a solvent mechanism, solvents typically used are methanol or ethanol. When methanol is used as the solvent, optimum conditions for the reaction are 5% sodium hydroxide in 20% methanol at 60°C for 60 minutes. This gives a weight loss of 5%.[1] When ethanol is the solvent of choice, it has been observed that the rubbing fastness of pigments is increased.[7] The concentration of sodium hydroxide required will decrease with the increasing temperature.

Quaternary ammonium salts are usually used as the cationic catalyst when the reaction occurs in water at high temperatures.[6] The positively charged quaternary ammonium ions shield the negatively charged free group in the polyester, therefore facilitating further attack by hydroxyl ions. Because there is a lag time before the activity is appreciable, it is

likely that the OH ions are absorbed first by the fiber and that the attachment of the positively charged cationic ions is lower due to their bulky nature.[7]

When working at high temperatures, it is best to raise the temperature very gradually, at a rate of 1° to 2°C per minute, in order to avoid the appearance of cracks.

Utilizing a processing route to increase polyester hydrophilicity can be accomplished by using a batch process, a semi-continuous process or a continuous process.

A batch process involves utilizing equipment such as jigs, winch beck jets or overflow systems. The duration of the reaction can be calculated on the basis of the denier, caustic soda concentration, bath ratio and temperature. However, the calculation can be imprecise as it also is necessary to take into account not only the fiber type but the heat treatment history as well. Generally, an increase in weight loss is proportional to the concentration of sodium hydroxide.

In a semi-continuous process, the fabric is impregnated with caustic soda at a relatively high temperature prior to rinsing. There are two types of semi-continuous processes – pad batch process and pad roll process. The pad batch process entails the fabric being padded with 20-30% sodium hydroxide and then left to age for 12 to 24 hours at a temperature between 25° and 60°C. Utilizing the pad roll process, the fabric is padded with 10-20g/L of sodium hydroxide and left to age at 100°C in a microwave steam chamber.

A continuous process involves impregnating the fabric with caustic soda and then leaving it in either saturated or super heated steam at 105°-110°C. Debaca™ is one such continuous process developed by Montefibre and Sperotto SPA.[6] In a continuous process, weight loss also increases with alkali concentration, but eventually will reach a plateau.

Denier reduction is used widely, but it is difficult to accurately control the weight loss. Typical levels are 15-30% weight loss. The main reason for not achieving higher levels of weight loss is due to the decrease in the mechanical properties of the polyester fibers. Some research reports a loss of 20% in fiber strength and elongation.[2]

Research is being undertaken on new ways to achieve denier reduction without impacting the mechanical properties of the polyester fibers. One study reports the use of lipase[10] as a more environmentally compatible process because enzymes, generated from renewable resources, are biodegradable. Another paper reports a co-polymerization of acrylamide and diallyldimethyl ammonium chloride on the surface of the polyester.[11]

Chemical route: Topical finish

Another way of increasing the hydrophilicity of polyester is via a topical finish or chemical route. This implies the use of chemicals applied via padding. Fluorinated derivatives[4] are used widely as they exhibit anti-static and soil-release properties, therefore combining several "easy care" properties.

Another chemical route concept is to use a two-part molecule.[3] One part of the molecule will go into the polyester structure like a disperse dye and will confer durability. The other molecular part will be a highly hydrophilic chain. Typical technologies are silicone polyethers and organic quats.

Although topical finishes will confer instant wetting, they generally lack durability and softness.

Summary

Polyester is a growing fiber for textile applications, particularly in the fashion industry. The future of polyester appears bright as more and more consumers are attracted by its easy care properties. While the use of polyester is still restricted in some applications because of its low moisture regain, this is being addressed via denier reduction or topical finishes.

An ideal hydrophilic polyester solution has not yet been developed. Denier reduction can generate a substantial amount of waste, perhaps up to 30% polyester in effluent, and it lowers the mechanical properties of polyester. Microfibers are attractive as they combine properties such as hydrophilicity and a silk-like hand, however their applications are restricted to lightweight garments such as blouses. Topical finishes offer instant wetting but generally lack in durability and softness, and therefore require the use of additional softener. Lastly, solution costs also need to be considered. Although a cost can be offset by high-tech applications, traditional segments like fashion are more price-sensitive.

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RELATED PROCEEDINGS APPENDIX TO APPEAL BRIEF

NONE. Appellants are unaware of any related proceedings as identified in 37 C.F.R. §§41.37 (c)(1)(ii) or (c)(1)(x).